WHAT IS CLAIMED IS:

1. A semiconductor device comprising:

a semiconductor substrate; and

a MOSFET provided on the semiconductor substrate, the MOSFET including a gate insulating film and a gate electrode provided on the gate insulating film,

wherein said gate insulating film has a higher dielectric constant in a side contacting the semiconductor substrate than in a side contacting the gate electrode.

2. The semiconductor device according to claim 1, wherein the gate insulating film of the MOSFET has a dielectric constant which is higher in the side contacting the gate electrode than that of a silicon oxide film.

3. The semiconductor device according to claim 1, wherein the gate insulating film of the MOFET is made of one of Si_xN_y, Ta_xO_y, Ti_xO_y, Hf_xO_y and Zr_xO_y.

4. The semiconductor device according to claim 1, wherein the gate insulating film of the MOFET is a SiON film and has a region which contacts the gate electrode and into which oxygen has been introduced.

5. The semiconductor device according to claim 1, wherein the gate insulating film of the MOFET is a Hf silicate film identified as $(HfO_2)_x(SiO_2)_{1-x}$, in which a ratio $(HfO_2)/(SiO_2)$ is greater in the side contacting the semiconductor substrate than in the side contacting

the gate electrode.

6. A semiconductor device comprising:

a semiconductor substrate; and

a MOSFET provided on the semiconductor substrate, the MOSFET including a gate insulating film and a gate electrode provided on the gate insulating film,

wherein said gate insulating film has a higher dielectric constant in a center part than in edges.

7. The semiconductor device according to claim 6, wherein the gate insulating film has a higher dielectric constant than a silicon oxide film.

8. The semiconductor device according to claim 6, wherein the gate insulating film, except edges thereof, has a substantially uniform dielectric constant.

9. The semiconductor device according to claim 6, wherein the gate insulating film has a higher dielectric constant in a center part than in edges, along a channel length direction of the MOSFET.

10. The semiconductor device according to claim 6, wherein the gate insulating film of the MOSFET is made of one of Si_xN_y, Ta_xO_y, Ti_xO_y, Hf_xO_y and Zr_xO_y.

11. The semiconductor device according to claim 6, wherein the gate insulating film of the MOFET is a Hf silicate film identified as $(HfO_2)_x(SiO_2)_{1-x}$, and has a higher Si concentration in edges than in a center part.

12. The semiconductor device according to claim 6, wherein the gate insulating film of the MOSFET is a Hf

silicate film having $(HfO_2)_x(SiO_2)_{1-x}$, and has a higher Al concentration in edges than in a center part.

13. A method of manufacturing a semiconductor device comprising a semiconductor substrate and a MOSFET provided on the semiconductor substrate, the MOSFET including a gate insulating film and a gate electrode formed on the gate insulating film, said method comprising:

forming the gate insulating film having a first dielectric constant, on the semiconductor substrate; and

forming a region in a side of the gate insulating film contacting the gate electrode to have a second dielectric constant lower than the first dielectric constant.

14. The method according to claim 13, wherein the forming of the gate insulating film includes forming a SiON film on the semiconductor substrate, and the forming of the region having the second dielectric constant includes introducing oxygen into the SiON film.

15. The method according to claim 14, wherein the forming of the gate insulating film includes forming a Hf silicate film identified as $(HfO_2)_x$ $(SiO_2)_{1-x}$, on the semiconductor substrate, the forming of the region having the second dielectric constant includes introducing oxygen into the Hf silicate film, thereby

setting a low HfO_2 ratio in that surface of the Hf silicate film which contacts the gate electrode and a high HfO_2 ratio in that surface of the Hf silicate film which contacts the semiconductor substrate.

16. The method according to claim 15, wherein the Hf silicate film is formed at about 400°C.

17. The method according to claim 15, wherein the Hf silicate film is formed by alternately supplying a Hf-based feed gas, a Si-based feed gas and oxygen gas into a film-forming atmosphere while increasing a supply rate of the oxygen gas with time.

18. A method of manufacturing semiconductor device comprising a semiconductor substrate and a MOSFET provided on the semiconductor substrate, the MOSFET including a gate insulating film and a gate electrode formed on the gate insulating film, said method comprising:

forming the gate insulating film having a first dielectric constant, on the semiconductor substrate; and

forming a region in edges of the gate insulating film to have a second dielectric constant lower than the first dielectric constant.

19. The method according to claim 18, comprising:

forming as the gate insulating film having the first dielectric constant a Hf silicate film;

etching the Hf silicate film to a prescribed thickness by using a hard mask, except a part which lies beneath the hard mask; and

forming the region having the second dielectric constant in the edges of the gate insulating film by introducing silicon, via those parts of the Hf silicate film which are exposed by etching, via parts of the Hf silicate film which lies on edges of the gate insulating film.

20. The method according to claim 19, wherein silicon is introduced into said parts of the Hf silicate film, by exposing said part of the Hf silicate film to silicon radicals at a temperature of at least 400°C.

21. The method according to claim 18, comprising:

forming a HfO_2 film as the gate insulating film having the first dielectric constant;

etching the HfO_2 film to a prescribed thickness by using a hard mask, except a part which lies beneath the hard mask; and

forming a region having the second dielectric constant in the edges of the gate insulating film, by introducing aluminum, via those parts of the Hf silicate film which are exposed by etching, into parts of the Hf silicate film which lies on edges of the gate insulating film.

22. The method according to claim 21, wherein aluminum is introduced into said parts of the Hf

silicate film, by exposing the said part of the Hf silicate film to aluminum radicals at a temperature of at least 400°C.